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Utilizing Magnetic Building Blocks as A Learning Medium to Enhance Creativity in Early Childhood (Qualitative Case Study at ABA 2 Kindergarten, East Ungaran, Semarang Regency)

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Abstract

Purpose: This study aims to analyze the use of Magnetic Building Blocks as a learning medium to enhance creativity in early childhood. This research is motivated by the critical need to stimulate creativity from an early age through constructive, educational, and enjoyable play activities.

Methodology: This study uses a qualitative approach with a case study design. This research was conducted at ABA 2 Kindergarten in East Ungaran with 15 Group B children aged 5-6 years in the 2025-2026 academic year. Data were collected through participant observation, semi-structured interviews with teachers and parents, and documentation of children's work.

Results: The findings indicate that the use of Magnetic Building Blocks significantly improved all six aspects of children's creativity: ideational fluency, originality, flexibility, elaboration, problem-solving, and persistence. Children became more active, independent, and demonstrated higher-order creative thinking. They demonstrated increased courage in expressing original ideas, adapting their strategies, and persevering in completing tasks.

Application/Originality/Value: This study concludes that the Magnetic Building Blocks Game is an effective and innovative learning medium for stimulating creativity in early childhood. It provides empirical evidence of its application in real-life educational settings, offering a practical alternative for kindergarten institutions to implement a constructive, play-based learning approach that encourages holistic creative development. This medium is recommended as a valuable tool for educators seeking to create meaningful and engaging learning experiences.

Introduction

Early Childhood Education (PAUD) is a level of education that emphasizes laying the foundations for comprehensive growth and development, encompassing physical, psychomotor, psychological, and social aspects. This means that early childhood education has a noble task: developing children's potential so they can adapt to their environment. Specifically, the goal of early childhood education is to develop quality children, develop at their own pace, and prepare them for primary education. According to Minister of Education and Culture Regulation No. 146 of 2014 concerning the 2013 Curriculum for Early Childhood Education, Early Childhood Education is a development effort aimed at children from birth to six years of age, delivered through educational stimulation to foster physical and spiritual growth and development, ensuring they are ready to learn and enter further education (Sari & Fauziyah, 2022).

One important aspect of development that needs to be stimulated early is creativity. According to Sasmita et al. (2021), creativity is the ability to create something new, whether in the form of ideas or tangible works, as a result of divergent and imaginative thinking. In other words, creative children have a tendency to experiment, try new things, and dare to take risks. In the context of early childhood, creativity is demonstrated through children's ability to think flexibly, imagine, and create something from their play experiences. Melzer et al. (2022) argue that creative children possess four characteristics: fluency, flexibility, originality, and elaboration. Creative children typically demonstrate high curiosity and motivation, enjoy trying new things, and have the courage to express their ideas. With these four main characteristics, children will be able to produce something that is not simple and different from other students (Septianingtiyas & Khasanah, 2023).

The development of creativity in kindergarten varies; even in a single day, many creative activities can be developed through various integrated learning methods. However, the facts at ABA 2 Kindergarten in East Ungaran show that learning is still oriented towards results, not processes. Previous research has shown that young children are often encouraged to imitate the work of teachers or peers rather than create their own. This situation leads to underdevelopment of children's creativity because they are not given the opportunity to think critically and openly. To address this, teachers need to use learning media that can foster children's interest, curiosity, and exploration. One

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effective medium for stimulating children's creativity is constructive play-based learning media, such as magnetic building blocks.

Peng & Su (2024) explain that design and construction-based activities such as playing with blocks can stimulate creative thinking and problem-solving skills. Therefore, the use of attractive and easy-to-use magnetic building blocks can be an alternative creative learning medium that supports the implementation of a STEAM-based curriculum in early childhood education (PAUD). According to Safitri (2023), playing with blocks is a fun activity for early childhood and can help stimulate their growth and development. Furthermore, playing with blocks can evoke feelings of joy and happiness in children involved in the play. Veryawan (2020) explains that to maintain children's creativity and skills, teachers must pay attention to their natural instincts, which strongly support their creative growth and development. Therefore, playing with blocks serves not only as entertainment but also as a meaningful and educational learning medium. According to Kao et al. (2025), the types of blocks used in learning today are increasingly diverse, including magnetic building blocks, which can be arranged using a magnetic system, making them easier for children to manipulate.

Magnetic building blocks consist of colorful magnetic blocks that easily attach to each other and form various three-dimensional structures, allowing children the freedom to combine, separate, and shape various objects according to their imagination (Zhang et al., 2020). The advantages of magnetic building blocks over conventional blocks are that they are lightweight, safe, and easy for children to manipulate. Their bright colors and magnetic effect also add to their appeal, increasing children's focus during play and encouraging them to experiment with the shapes and structures of the magnetized blocks. Compared to conventional wooden blocks, magnetic building blocks are more flexible, safer to use, and allow children to create a wider variety of structures without easily collapsing or breaking.

According to Kao et al. (2025), constructive block-based learning can enhance dimensions of creativity such as fluency of ideas, originality, and openness to new ideas. Research conducted by Zhang et al. (2020) shows that the use of magnetic building blocks can improve children's creativity scores on the Torrance test, particularly in terms of fluency, flexibility, and originality. Meanwhile, research by Suryana & Desmila (2022) found that magnet-based constructive media helps children think systematically, collaborate, and demonstrate perseverance in solving challenges and solving problems while playing. This is in line with Piaget's (1962) constructivism theory and Vygotsky's (in Hes & Reider, 1985) view that children learn most effectively when they actively interact with their environment and engage in meaningful social activities. Research by Kewalramani et al., (2020), also discussed that the introduction of magnetic blocks expands children's opportunities for STEAM/engineering play, and this type of block can provide different stimulation for creativity and design thinking than ordinary children's blocks.

Initial observations of 15 children in Group B of ABA 2 Kindergarten, East Ungaran, showed that during block play activities, only five could build blocks based on their own ideas and develop a building structure. The rest simply copied examples from teachers or friends. They were not yet brave enough to try new ideas and quickly became bored when asked to create something different independently. Children also easily lost focus when participating in play activities deemed uninteresting. Furthermore, children lacked the ability to collaborate ideas and express them in the forms of block structures they created. This was evident in the six block play sessions, where children could only create roughly the same shapes as in the previous session.

Various blocks were introduced to the children in various shapes and sizes, each given a different color. The wood material was naturally made from a soft, lightweight material that would not harm children. The block shapes introduced to the children included rectangles, cubes, isosceles triangles, long blocks, round pieces with a hole in the center, long cylinders, short cylinders, and so on. The purpose of playing with blocks in various shapes is to encourage children to create things from them according to their imagination and creativity.

Based on discussions with homeroom teachers, innovative learning media are needed that can foster children's enthusiasm, interest, exploration, and creativity. One alternative deemed appropriate for the characteristics of early childhood is Magnetic Building Blocks. Besides being engaging and fun, this medium also provides freedom for children to experiment. This medium was chosen because it aligns with the characteristics of early childhood, who enjoy playing while learning, enjoy experimenting, and are attracted to colorful and moving objects. Furthermore, the activity of building and dismantling magnetic blocks can develop hand-eye coordination, strengthen fine motor skills, and improve children's focus and concentration. The free-flowing building process also provides space for children to express their imagination without fear of making mistakes. According to Rukiyati et al. (2017), building block play can be fostered through various methods, one of which is the hands-on method. Learning with this method provides children with the opportunity to see, feel, imagine, and construct structures. By using Magnetic Building Blocks, children are expected to have the opportunity to develop their imagination, creative thinking, experimentation, communication, and learning to collaborate with peers. This research is expected to provide both theoretical and practical benefits.

Based on the aforementioned observations, the researcher is interested in investigating this issue. The researcher aims to determine and analyze the use of magnetic building blocks in enhancing creativity in early childhood at ABA 2 Kindergarten in East Ungaran. This research is expected to contribute to enriching play-based learning strategies in early childhood education (PAUD) and serve as a reference for teachers in developing innovative media to stimulate children's creativity.

Method

This research uses a qualitative approach with a case study design. According to John W. Creswell, as quoted by Pattilima (2015), qualitative research is an investigative process to understand social problems based on holistic creation, expressed in words, reporting informants' views in detail and organized within a scientific setting. This research procedure produces descriptive data in the form of written and spoken words from people and observed behavior (Sugiyono, 2010).

The focus of this research is to analyze how playing activities using Magnetic Building Blocks can improve six aspects of children's creativity: (1) fluency, which is the child's ability to generate a variety of ideas; (2) originality, which is the ability to create unique ideas; (3) flexibility, which is the ability to change thinking approaches according to the situation; (4) elaboration, which is the ability to elaborate ideas in depth; (5) problem-solving skills; and (6) perseverance, which is a consistent and persistent attitude in completing tasks. This research was conducted at ABA 2 Kindergarten, East Ungaran, Semarang Regency, Central Java, from May to July 2025. The subjects were 15 children aged 5-6 years in Group B of ABA 2 Kindergarten, East Ungaran, Semarang Regency. In addition to the children, the class teacher and parents/guardians of Group B students were also involved as key informants to strengthen the observational findings.

This study used three data collection techniques. First, participant observation, in which the researcher directly participated in children's play activities to observe emerging creative behavior. Observations were conducted to determine the development of children's creativity through magnetic building block play at ABA 2 Kindergarten, East Ungaran, using an observation sheet compiled based on Torrance's six aspects of creativity. Second, semi-structured interviews were conducted with teachers and parents to obtain insights into changes in children's behavior and creativity following the use of magnetic building blocks. The instrument used was an interview with interview indicators designed to elicit in-depth information about how magnetic building block play can enhance children's creativity and the role of various factors in this process. The data collection procedure through interviews was conducted by asking questions to students, teachers, and guardians to obtain subjective information or perceptions. Before conducting the interviews, researchers prepared interview questions using simple language for easy understanding. Third, documentation in the form of photographs, video recordings of activities, and children's artwork was collected as authentic evidence to support the observations and interviews.

The collected data was then analyzed using the Miles and Huberman model, which consists of three stages: data reduction, data presentation, and conclusion drawing. Data reduction was carried out by selecting data relevant to the research focus. Data presentation was carried out in the form of descriptive narratives and observation tables to facilitate interpretation. The final stage was conclusion drawing, which was carried out in stages while verification was conducted to ensure the accuracy of the interpretation.

To maintain data validity, this study employed source and technique triangulation. Source triangulation was conducted by comparing data obtained from children, teachers, and parents. Technique triangulation was carried out by combining the results of observations, interviews, and documentation. Furthermore, member checking was conducted with teachers to ensure the findings aligned with field conditions. Through these stages, the data obtained was expected to be valid, objective, and factually depict the situation.

This study involved children, therefore, the researcher sought consent from parents, guardians, and the children themselves. The researcher sought consent from parents or guardians regarding the researcher's participation in play with the children for two months, as they, as parents, have rights over their children. Researchers also sought consent from children as gatekeepers of their own accounts, capable of understanding and deciding whether or not to share their experiences, and possessing the ability to express their consent. Therefore, at the beginning of the study, researchers approached the children by playing with them until they were able to engage in conversation, answering and asking questions, and greeting them. This consent was given consciously, with researchers providing complete information regarding the purpose of the study, the methods to be used, potential risks, benefits, and any potential consequences. Furthermore, researchers explained the rights of research subjects, such as the right to withdraw at any time without negative consequences (Astawa, Wirata, et al., 2025).

Results

Children are more enthusiastic and engaged in learning when activities are presented in the form of engaging games. This approach aims to stimulate and enhance children's creativity and thinking skills through fun play. The games implemented at ABA 2 Kindergarten in East Ungaran, Semarang Regency, must be designed to facilitate children's imaginative exploration and capture their interest. Children are encouraged to create new combinations that stimulate their creativity. Because every child has creative potential that needs to be developed through interactive and enjoyable learning experiences, the most important aspect of children's learning is that it must be enjoyable for them. Furthermore, play activities also serve to stimulate children's interest in learning, enabling them to collaborate and communicate effectively with their peers. At ABA 2 Kindergarten in East Ungaran, Semarang Regency, it is known that education is

delivered holistically, where teaching focuses not only on academic aspects but also on developing children's creativity. This is believed to help prepare children to become creative individuals ready to face future challenges.

Based on the results of the activities, it was observed that the children showed progress, demonstrating active engagement during the learning process using media. Children enthusiastically select and arrange magnetic blocks into various shapes according to their imagination, actively constructing them themselves through interactions with their environment. This play activity provides an opportunity for children to experiment with various combinations of shapes and colors based on their own ideas and imaginations.

Furthermore, teachers appeared to provide support by asking provocative questions and providing opportunities for children to explain their creative ideas. Researchers also used observations of children's participation with students to identify obstacles they encountered during the Magnetic Building Blocks play process. Throughout the activity, interactions occurred between children and their peers, both in the form of collaboration and the exchange of ideas while constructing spatial structures together. The children's work demonstrated an increase in the variety of shapes in each session.

Documentation revealed changes in children's activities from the initial to the final stages of learning. In the initial stages, children still needed teacher guidance, while in subsequent sessions, children began to become more independent and demonstrated courage in developing ideas, demonstrating imaginative power, curiosity, and originality (the ability to create something new and unusual). The classroom environment appeared more lively and dynamic as children engaged in more frequent discussions, experiments, and new experiences using the Magnetic Building Blocks.

Overall, the results of the study illustrate that the application of Magnetic Building Blocks media encourages the emergence of creative behavior in early childhood as well as an effort to stimulate, guide, nurture, and provide learning activities that will produce children's abilities and skills in a fun, natural, and contextual play atmosphere in accordance with the characteristics of learning in PAUD. The results of this study are in line with the opinion of Rosalia (2018) where constructive play in the form of magnetic building blocks will not make children feel bored because in this game what is important is the results and children's pleasure. Children will be very busy making new things such as making houses, towers, vehicles and so on. This game will also not make children lazy, because in this game children continue to use their imagination to make new and unique things.

The following is a description of the magnetic building block game carried out at ABA 2 Kindergarten, East Ungaran, Semarang Regency.

Figure 1. Children experimenting with magnetic building blocks
during play-based learning
(alternate photo: teacher guiding two children as they assemble a magnetic tower)

Figure 2. Examples of children's creative constructions
(photos substitute: views of completed structures—houses, bridges, and towers)

Observation Results Based on Creativity Aspects

The following table summarizes the improvement of 15 children in six dimensions of creativity as defined by Torrance (1974): fluency, originality, flexibility, elaboration, problem solving, and persistence.

Table 1. Observation Results of Children's Creativity Development

No	Nama	Sebelum						Sesudah					
		Fluency	Originality	Flexibility	Elaboration	Problem Solving	Persistence	Fluency	Originality	Flexibility	Elaboration	Problem Solving	Persistence
1.	Keenan	2	1	2	1	1	3	4	3	4	3	4	5
2.	Nayla	2	2	2	1	2	3	4	3	4	3	4	4
3.	Dafa	3	2	2	2	2	3	5	4	4	4	4	5
4.	Alya	2	1	2	1	1	2	4	3	4	3	3	4
5.	Raka	3	2	2	2	2	3	5	4	4	4	4	5
6.	Asha	2	1	2	1	1	2	4	4	4	4	4	4
7.	Lubna	2	1	1	1	2	2	4	3	4	3	4	4
8.	Aina	2	2	1	1	2	2	4	4	4	4	4	5
9.	Raka	3	2	2	2	2	3	5	5	5	5	4	5
10.	Bagus	3	2	2	2	2	3	5	4	5	4	4	5
11.	Hafizh	2	1	1	2	2	3	5	5	4	4	3	4
12.	Sinta	2	1	2	2	1	2	5	5	4	4	4	4
13.	Rafif	3	2	1	2	2	3	5	4	5	5	4	5
14.	Rafa	2	1	2	1	1	2	4	4	4	3	3	4
15.	Dafa	2	1	2	1	1	2	4	4	4	3	3	5

Table 1 above shows consistent improvements across all six dimensions of creativity. After several sessions using Magnetic Building Blocks, children became more fluent in expressing ideas, demonstrated greater originality, and demonstrated greater persistence in completing their projects. The use of Magnetic Building Blocks encouraged children to be more active, creative, bold in expressing their ideas, and demonstrated persistence and confidence. Positive changes were observed in the six main aspects of creativity: ideational fluency, originality, flexibility, elaboration, problem-solving ability, and persistence.

a. Fluency

After implementing Magnetic Building Blocks, children demonstrated an increased ability to generate diverse ideas to solve problems beyond their usual categories. Whereas previously only a small number of children were able to name more than one idea, after using this medium, almost all children were able to express a variety of ideas, such as building a house, a tower, a bridge, and even a vehicle like a car. Children also found new ideas more quickly without having to imitate the teacher's examples. Teachers reported that children now prefer to express themselves and act naturally without pretense. If previously they waited for directions, now they immediately say, "Mom, I want to make a robot or a ship!" This shows that magnetic media successfully stimulates children's fluency in thinking.

b. Originality

Children begin to develop original or original thinking, creating unique building shapes that differ from one another. Most children no longer imitate the shapes of their peers, but instead combine various elements according to their own ideas/imaginations. For example, a tower with two roofs, a multi-story house with a large yard, or a car with an asymmetrical yet creative shape. The teacher stated that "the children created shapes I had never thought of before. They dared to try new things even though the shapes were not yet perfect." Documentation results showed that approximately 80% of the children produced original work or work with their own original ideas that differed from the initial examples.

c. Flexibility

Flexibility also increased significantly. Children were able to adjust the shape of their designs when the materials used, namely blocks, were limited or the structure was unbalanced. They learned to change strategies by incorporating existing ideas into their work without losing enthusiasm. When a building collapsed, the children immediately repaired it by trying to reposition the magnets in various positions. The teacher stated that "the children now don't give up easily and demonstrate fluid thinking. If their building collapses, they say, 'I'll fix it again, Mom, so it's strong and won't collapse.'" This demonstrates flexible and adaptive thinking skills in facing challenges when playing with blocks, so no further maintenance is needed to stimulate the development of children's creativity.

d. Elaboration

The children's ability to enrich and create something new and imaginative from their work also improved. While initially, the children only made basic shapes, such as a simple house, after several sessions, they began adding details such as windows, doors, fences, and even a large yard for a car garage. Approximately 70% of the children exhibited work with additional decorative elements, demonstrating their ability to express their inner ideas. The teacher reported that "the children began to pay attention to detail, saying, 'I added a large yard so I could build a car garage.'" This improvement indicates that the children are able to develop their imagination and express their feelings through deeper play.

e. Problem Solving

During play, children often encounter situations where the structures they construct collapse easily or where the magnetic blocks don't stick properly. Through the process of trial and error, repetition, and correction, children learn to think critically and find solutions to their problems. Children also need to concentrate to prevent their structures from collapsing. Most children are able to identify the cause of their failure and repeat the process, then adjust the magnet's position to make the structure stronger. Teachers noted that "children are beginning to find their own ways to solve the problems they encounter. They begin to recognize and understand that if the magnet at the bottom is weak, it must be replaced or reinforced with a larger block." This demonstrates the development of logical thinking and more mature problem-solving skills.

f. Persistence

Playing with Magnetic Building Blocks is a play tool that can optimize various aspects of child development, one of which is persistence. This activity is both educational and constructive, providing numerous benefits for children's development and learning. Examples of these benefits include developing concentration, patience, sharpening intelligence, and fostering resilience. Playtime, which initially lasted around 10-15 minutes, increased to an average of 25-30 minutes, with a high level of engagement. The children also showed enthusiasm for completing their constructions despite facing various difficulties. The teacher stated that "now the children's playtime is longer. They don't get bored easily and want to complete their constructions until they are complete and in line with their imagination." This persistence demonstrates an increase in intrinsic motivation in the children during the constructive play process.

Discussion

Research results show that the use of Magnetic Building Blocks can enhance the creativity of early childhood and help develop the developmental aspects of Group B children at ABA 2 Kindergarten in East Ungaran. Play is a self-directed activity; during play, children are encouraged to practice skills that can guide cognitive development, language development, socio-emotional development, and physical-motor development, as well as six aspects of children's creativity. This improvement is evident from observations, interviews, and documentation, which describe children's development in six aspects of creativity: fluency of ideas, originality, flexibility, elaboration, problem-solving skills, and perseverance.

Through constructive play activities using Magnetic Building Blocks, children are given the opportunity to generate new, unprecedented ideas, think freely, dare to experiment, and create various structures based on their imagination. This aligns with Torrance's (1974) theory, which states that creativity encompasses the ability to generate ideas fluently, flexibly, and in detail. Playing with blocks also helps children think logically and understand the relationships between objects (Sari & Fauziyah, 2022).

Magnetic Building Blocks also enhance elaboration and persistence in early childhood. When constructing a building, children add detailed constructions such as windows, additional roofs, or large yards and remain focused until their work is complete. This is supported by research by Lazzara et al. (2025), which states that STEAM-based block play activities encourage collaboration, perseverance, and imagination in children. Playing with Magnetic Building Blocks is a challenging activity where children can construct various shapes, stack blocks like towers, or disassemble and rearrange blocks into other shapes.

Observations show that children who were initially passive and often imitated the teacher's example became more active and daring to try new shapes after several sessions. Children demonstrated flexible thinking skills by changing shapes when their buildings collapsed or became unbalanced. When children play with blocks, their patience is tested because they must stack the blocks one by one until they form the desired structure or shape. This is in accordance with the opinion of Melzer et al., (2022) who stated that creativity includes fluency, flexibility, originality, and elaboration in thinking. This finding is also in line with the view of Vygotsky (1978) (in Hes & Reider, 1985) that children learn best through direct experience and interaction with their social environment. The results of interviews with teachers and parents also showed that children were more active and communicative when playing with Magnetic Building Blocks. Children often discussed, asked questions, and helped each other when building large shapes. Teachers also considered this medium more interesting than ordinary wooden blocks because it is easy to build, does not fall easily, and provides quickly visible results. This teacher's statement is in line with research by Lazzara, et al., (2025) which showed that STEAM-based block games can foster creativity, collaboration, and self-confidence in children. Similarly, it was also

emphasized that various types of blocks, including magnetic blocks, are effective in improving children's spatial thinking and creativity.

Furthermore, the results of this study support Vygotsky's (1978) theory, as cited by Hes & Reider (1985), which emphasizes the importance of social interaction and the role of the environment in children's cognitive development. When playing with Magnetic Building Blocks, children interact with peers and teachers in a fun and engaging learning environment, thereby engaging their interest. This interaction encourages children to express ideas, discuss, and learn/observe directly from the experiences of others. This suggests that this medium not only enhances cognitive abilities but also develops children's social and communication skills.

In addition to enhancing creativity, this activity also fosters children's problem-solving skills. Children learn to correct mistakes when their building collapses and develop new strategies/treatments to create stronger structures. In addition to finding balance and choosing which blocks are long enough, children must also estimate the number of toys per set of blocks, name the building they successfully built, and demonstrate and construct similar, or even smaller, or larger, structures. This demonstrates the development of critical and logical thinking skills, relevant to research by Busetto et al. (2020) that qualitative methods can reveal a deeper understanding of learning phenomena that occur naturally in a child's environment.

Thus, the use of Magnetic Building Blocks is highly effective in fostering creativity in early childhood. This medium helps children experiment freely, use their imagination, and develop creative thinking skills through fun and meaningful play-based learning activities.

Conclusion

The general conclusion of this study is that early childhood creativity can be enhanced through playing with magnetic building blocks, particularly in Group B, ages 5-6, at ABA 2 Kindergarten in East Ungaran, Semarang Regency. Through playing with magnetic building blocks, children's creativity can be enhanced across six aspects of creativity: fluency of thought, originality, flexibility, elaboration, problem-solving skills, and perseverance, all of which experience significant development after the learning activity. Children become more active, independent, persistent, and demonstrate higher levels of creative thinking skills.

This research is expected to contribute to knowledge regarding the development of children's creativity through playing with magnetic building blocks. Principals can benefit from creating a culture of innovation in their schools by encouraging the use of constructive play. Educators can benefit from providing ideas on how to make learning enjoyable and develop children's creativity through constructive play in kindergarten. The benefits for children include fostering creativity and maximizing their potential. Researchers can also benefit from providing information and references regarding the development of children's creativity through constructive play, as well as providing input for future research that will further examine and discuss the development of children's creativity through constructive play in kindergarten.

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